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CORNELL STUDY BULLETINS 2

High School Observation

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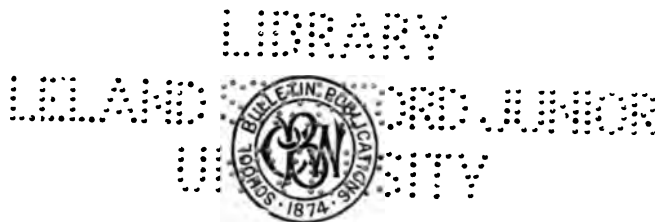
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CORNELL STUDY BULLETINS
FOR
TEACHERS

No. 2

GUIDE TO
HIGH SCHOOL OBSERVATION

BY
G. M. WHIPPLE



SYRACUSE, N. Y.
C. W. BARDEEN, PUBLISHER
1908

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GUIDE TO HIGH SCHOOL OBSERVATION

Purpose and use of the bulletin. The primary purpose of this bulletin is to serve as a guide to the observation of high-school teaching now required of college students of education in the State of New York. It will serve equally well, however, for all such visitation elsewhere, whether by candidate, principal, or superintendent, and it will enable all young teachers to check up and improve their own work.

In the State of New York, to qualify for the College Graduate Certificate each candidate is required to spend twenty hours in observation of school work actually in progress. It is desired that a record of each visit of observation be made in a permanent note-book.

It is, of course, not expected that all of the questions can be answered for each exercise observed, but in a series of visits the attempt should be made to cover as many points as possible. It is suggested that a copy of this guide should be at hand during each observation, and that the points upon which observation is made be checked off at the time in such a way that the guide can afterward be used in writing up the note-book.

Some of the questions, *e. g.*, those concerning the content of courses, demand more than the mere observation of class exercises. To answer these, the candidate may usually obtain information from the school program, from the teacher in charge, or from an examination of the text-books in use, but it might be well to expend a portion of the observation upon a school with the organization of which the candidate is already familiar. It is further to be desired that the candidate should observe work in more than one institution, and that, for comparative purposes, at least one small and one large school be visited.

A. Observation of the School Program, Curriculum, Attendance, and General Organization

1. Whenever possible secure printed schedules of the school visited. Note herein the number of courses offered (classical, scientific, etc.) the freedom of election allowed, the apportionment of time to the main groups, such as ancient languages, modern languages, science, English and history, etc. In the case of classes you visit, pay particular attention to the sequence of studies in these groups, to the time allotted, and the ground covered. Compare the school program in these respects with the recommendations of the Committee of Ten and with the specimen programs given in DeGarmo's *Principles of Secondary Education*, Appendixes A-E, especially Appendix B. Cf. questions 57, 94-7, 127, 142, 174 and 201.

2. **Size and attendance.** The most frequent type of high school is the small school with one, two or three teachers. The average high school has fewer than 90 pupils, and numbers approximately 0.8 per cent. of the local population. Compare the school visited with these figures.

3. If the school visited was a small one (not over three teachers), how did this limitation of the teaching staff affect its work, *e. g.*, were recitation periods shortened; was there more text-book and less laboratory and field work; was the number of courses limited and the freedom of election thereby curtailed; were the teachers overtaxed; were they less well prepared for their work, etc? Were there any advantages that would have been absent in a larger school? If the school was a large one (eight teachers or over), what advantages appeared in comparison with smaller schools? What disadvantages? On the qualifications and efficiency of teachers, see particularly questions 39, 67, 68, 70, 74, 105, 108, 110, 116, 135, 143, 155, 156 and 182.

4. What percentage of the eighth grade entered the high school? The estimated entrance for the country at large is 5%.

5. The estimated distribution of attendance in American high schools in 1903-4 was: 1st year, 43 %; 2d year, 26%; 3d year, 18%; 4th year, 13%. Compare the school visited with these figures. What percentage of those who enter complete the full course and graduate? Are any specific measures employed to encourage attendance and prevent withdrawal from the school?

6. The Report of the Committee of Ten recommends that the **work of students not going to college** should be identical with that of those who are going to college just so far as the two classes pursue the same subjects. Was this principle approved and followed in the school visited? What reasons were assigned for any variations observed? To what extent in general did the work of the school seem to be arranged to meet college entrance requirements? Were any special classes formed for this purpose?

7. Were **grammar-school pupils** encouraged and allowed to begin such high-school studies as they were prepared for? If so, what effect had this upon attendance in the high school? Was care taken to adjust the grammar-school work, particularly that of the seventh and eighth grades, to secure an early entrance upon high school studies, *i. e.*, was the course of study so systematized as to avoid any break between grammar and high school and to prepare pupils for the undertaking of high-school studies?

8. Were **related studies** or groups of studies so arranged in the program and so taught as to make their important inter-relations apparent to the pupil?

9. Was the training for securing efficiency in the use of knowledge equal to that for securing insight? Cf. questions 27, 34, 57, 112, 115, 126, 127, 131, 134, 146, 157, 161, 176 and 199.

10. Were there any **clubs or societies** in the school aside from

secret societies or athletic associations, *e. g.*, debating or literary societies, scientific, mathematical, or English clubs, etc? Was membership confined to teachers or to pupils alone? Cf. question 39.

11. Were any school or public **lectures** given by the teachers or outside talent? How supported? Is the building used for any other purposes, aside from the regular work of instruction?

12. Was the school **co-educational**? To what extent, in seating, in attendance at class exercises, school functions, etc., was segregation of the sexes observed?

13. Was the school provided with an adequate reference **library** With a reading room? At what hours accessible to students?

B. Observation of Psychological Principles in Teaching

N. B.—Questions in this section are to be undertaken in all classes visited.

14. **School exercises** may be classed as lectures, recitations, examinations, written or verbal (quizzes), laboratory, shop or field exercises, as review, drill, or study lessons, assignments, etc., or they may be further described in terms of method of conducting or treatment of the topic as heuristic, Socratic, individual, developmental or genetic, inductive, deductive, etc. Which of these terms apply to the exercise and method observed?

15. **Instinct.** Did you observe any appeal to, or operation of, instinctive tendencies, such as competition (emulation), curiosity, play (and games), imitation, the migratory instinct, social interests (sympathy, co-operation, altruism), interest in constructive work, in making collections, in esthetic or artistic expression, etc? Any instances in which these tendencies were advantageous, or the contrary?

16. **Individual differences. Temperament.** To what extent and how did the teacher adapt his work to meet individual differences in temperament, in emotional type, in mental alertness or sluggishness, in breadth of general information, etc? Was any provision made for systematic individual instruction (Batavia method, arrangements for individual advancement, promotion, etc.)?

17. **Attention and interest.** What appeared to be the dominant motive behind the work of the class:—interest in the work, curiosity to know, spirit of competition, fear of displeasure of the teacher, desire to merit approval, desire to get good marks or mere habit and immersion in the routine of the day's work? In general, was 'effort' or 'interest' more conspicuous?

18. Was the attention attained of high degree: was it forced or natural: was it active, passive, or secondary passive in type?

19. Did all the pupils pay attention all the time? What means did the teacher employ to maintain the attention and interest of the reciting class, or the classes not reciting? Was there any appeal to 'false mediate interest,' or to the practical value or applications of the work? Did you see any evidence of wasted time due to inattentiveness or lack of application in classes reciting or studying: could this waste have been avoided and how? Cf. question 37.

20. **Motor expression: motor activity.** What proportion of the work and in what studies was opportunity furnished for motor activity or direct application of the information acquired in the lesson? Was the activity verbal, manual, or of what type? Was its object to develop technique, to secure physical or hygienic benefits, to assist in the acquisition of information, or what?

21. If blackboard work or written exercises were employed, was this work sufficiently neat and legible? Did the teacher take any pains to require neatness and good form as well as correctness of content, or was this work regarded merely as a means to an end?

22. **Learning, memory, association, apperception and observation.** Did you observe instances of learning by imitation or by practice (trial and error) as well as by instruction?

23. To what extent did the teacher make use of repetition, of vividness, and of organization in establishing associations and in securing permanence and recall?

24. Did the teacher skilfully and thoroly associate the new with the old? How much time and attention was devoted to 'preparation'? Was there any use of a definite plan such as the 'formal steps' in the conduct of the lesson? If there was a summary or application, was this made by teacher or pupils? Was the assignment calculated to

stimulate the pupil and assist him in the ensuing study or laboratory work? How much time was devoted to the assignment?

25. Was there any definite training in observation—of what sort and in what studies? How valuable? Cf. questions 34 and 157.

26. How did the pupils appear to remember and recall what they recited—by thinking, by 'logical' memory, or by mere verbal memory, by the use of artificial or mnemonic devices: did they depend on real knowledge of the content of the subject or mere 'booklearning?' If memoriter work was used, was it legitimately used? Which kind of memorizing did the text-book or the teacher encourage? On memoriter work, cf. questions 81, 106, 110 and 135.

27. **Imagination, active thought, reasoning.** To what extent, in what ways and in what studies did you see the exercise of creative imagination? Was some form of 'problem-solving' used in all studies? Was the original work done at the time in the class or had it been previously assigned for outside work? Was the training in this direction calculated to produce or develop general constructive ability in other lines? Cf. questions 9 and 34.

28. Did you see any statement of a principle or of any law worked out in the class: if so, how was it done? In what studies did you observe deductive reasoning: in what inductive reasoning? Did the teacher employ this opportunity to train the pupils in correct reasoning, in the elimination of bias, emotional influences, etc.?

29. **Verbal expression, language.** "More than one-half of the errors in philosophy," says Huxley, "have arisen from mistakes about the meaning of words." Did you see any evidence of such mistakes in the teaching you observed? Cf. question 86.

30. To what extent is the fluency and correctness of the language a pupil employs a reliable criterion of his knowledge and general ability?

31. Were there any instances in which the language used did not seem to express the real content of the pupil's mind? Did the teacher recast the language for him, or insist on further attempts by the pupil, or allow the form of the expression to pass unmodified?

32. Did the teacher in general insist on accuracy in the use of language? Was this carried to extremes? Were the efforts successful?

33. Did the method of conducting the recitation, especially the phrasing of questions, encourage or compel the pupil to express his ideas in good language? Were topics assigned for discussion or was the 'question-and-answer' method followed? Were the questions answerable by 'yes' or 'no' or did they demand full statements? Were 'pumping' questions used?

34. **Mental training or formal discipline.** Could you discriminate between the work of the teacher (a) in imparting information, and (b) in developing or training the pupil's capacities in a general way, *i. e.*, was anything acquired by the pupil apart from information that would be of value to him in other lines of activity? What was the nature, value and extent of this disciplinary training? Cf. questions 9, 27, 140, 141, 157, 161 and 207.

35. Were any steps taken by the teacher to build up good habits or ideals of a general nature, such as neatness, accuracy, attentiveness, industriousness, punctuality, good expression, honor, integrity, etc.? Cf. questions 112 and 114.

C. Observation of Discipline and Control, Moral Training.

36. What was the general 'spirit' or emotional tone of the class, or of the school as a whole—cheerful, eager, sullen, depressed, indifferent? What was that of the teacher or teachers? Did the mood of the teacher communicate itself to the class? How did the pupils' moods effect their own work? Did you observe any difference in the tone or discipline of different classrooms: to what do you ascribe it?

37. Did the teacher have to correct the behavior of any individual pupil: for what, in what manner? Did the teacher check incipient disturbance by questions directed at the offenders? Cf. question 19.

38. Was any school-government device employed, such as the 'School City', student monitors, honor system, etc.? How did it work? Cf. question 126.

39. Did you learn of any friction between the principal or teachers and the pupils with regard to the control of matters outside the classroom, *e. g.*, athletics, secret societies, class meetings, dances, or other social functions?

40. Was any formal instruction given in ethics or morality? What religious exercises, if any, were observed?

41. Was the movement of classes to and from rooms, to blackboards, etc., orderly or disorderly. systematic or uncontrolled?

42. Was there any roughness or discourteous behavior at recess or during recreation periods?

D. Observation of Hygienic Conditions

43. Did you note any undesirable features in the **school building**, in its location, size, orientation, architectural composition, quality of construction, lack of fire-proofing, arrangements of stair-ways, corridors, wardrobes, etc.?

44. Were the **classrooms** of proper size and shape, the seats well arranged, not overcrowded, etc.?

45. Was the **illumination** satisfactory with regard to the number, size, and distribution of the windows, color of walls and ceilings, kind of shades, use of artificial light?

46. Note **warmth and ventilation**. Was the air stuffy and heavy? Did you see any inlet and outlet flues,—large or small? Heated by what means?

47. Were the **seats and desks** hygienic? Adjustable? At proper distances?

48. How many pupils assumed **bad postures** in reading and writing? Describe the more typical of these undesirable postures. Did the teacher make an effort to correct them?

49. Did you notice any apparently uncorrected cases of **defective sight or hearing**? Any pupils holding their books too near their faces? How many wore glasses?

50. Was there any systematic medical or **hygienic supervision** of these pupils?

51. Did any of the pupils show signs of **over-work**—undue nervousness, generally poor health, chorea, fagged expression, poor nutrition?

52. Was the **writing** on the board sufficiently large and distinct to be legible to all? Was the text-book well printed?

53. Was writing taught formally? Had they been taught the vertical system? Did they use in school exercises vertical or slant writing?

54. Note any **exceptional children**:—unusually large or small, unusually bright or dull; any with marked physical defects.

55. Was the **playground** indoors or out or both? Was it adequate in size? Did teachers supervise the recess periods?

56. Was the **program** arranged with skilful interruptions to insure alternation of activity and rest or different types of activity? Was difficult work placed first on the program?

E. Observation of Classes in Foreign Languages. General Directions and Questions for Latin, Greek, German and French

57. Ascertain as far as possible the number of years or terms given to the language, the general apportionment of work therein: time allotted to grammar, to drill, to acquisition of vocabularies, to composition, to translation, to sight reading; ascertain what types of literature (fables, poems, dramas, histories, etc.) and what authors were read.

58. What was the chief aim of the translation work in the class visited:—to acquire facility with the foreign language, to acquire information concerning the nation or civilization represented by the foreign tongue, or to acquire facility in the use of English? Note carefully, and particularly whether the teacher insists upon translation into English of the best quality, fluent and idiomatic, or whether 'un-English' and senseless jargon is tolerated, thus destroying to a large extent the value of language training, especially that in the classics.

59. Was the use of 'ponies,' interlinear translations, or **English translations** of any sort advocated, tolerated, or surreptitiously practiced? If so, what effect did this have upon the training that translation is expected to give, and upon the value to the pupil of the study of the foreign languages in general?

60. Did the pupils seem to be getting the import of what they were reading about, or did they simply get disconnected sentences or phrases?

61. Was reading without translation a part of the exercises?

62. Was any sight translation done?

63. Did the pupils show a ready and accurate familiarity with **forms** and inflections, with principal parts of verbs, etc.? Was much attention paid to this in the class?

64. How much attention was paid to **derivation**: *i. e.*, to the relation of English terms to those found in the text? Was the attention given sufficient?

65. Was there **composition work** in the foreign tongue? If so, was it made a weekly exercise extending over some months, or was it condensed into daily exercises extending over a few weeks? Did the pupils give the sentences orally?

F. Observations of Classes in Latin

66. Answer questions Nos. 57 to 65 in the order given. As a most important element, describe carefully and fully the character of the **translation** in accordance with question 58.

67. Did the teacher know enough Latin to justify his attempt to teach it?

68. Did teacher and class exhibit enthusiastic **interest**, or was it absent from both? On whose part were there signs of life?

69. If the Roman method of **pronunciation** was attempted, was it accurately and thoroly taught and successfully practiced?

70. Did the pupils seem to have any knowledge of **Roman History**? Did the teacher? Cf. questions 95, 102, 103, and others in Section J.

G. Observation of Classes in Greek

71. Answer questions Nos. 57 to 65 in the order given.
72. Was attention paid to the Greek elements in English words?
73. Was attention directed to the force and value for rhetorical emphasis of word-position in the sentence?
74. Did the teacher seem to have such a command of the subject as to be able to supplement the text-book?
75. Did the artistic excellence of the Greek product, words, prose or poetry, receive notice?

H. Observation of Classes in German (or French)

76. Answer questions Nos. 57 to 65 in the order given.
77. What was the **method** or system of instruction: natural, classical, phonetic, Gouin, Berlitz, etc., or an adaptation of one of these?
78. What **language** was employed in the class? With what result?
79. To what extent was **object-teaching** employed?
80. Was German (or French) **conversation** introduced as an exercise?
81. Was the **memorizing** of poems or prose selections required, and to what extent?

I. Observation of Classes in English: Elocution, Rhetoric, English Composition, English Literature

82. To what extent (in classes not engaged in formal Elocution and Oratory) was **reading aloud** from English texts, prose or poetry, required of the pupils?

83. In such reading, how much guidance and how much correction were given with a view to enforcing clearness and ease of utterance?

84. In especial, to what extent were the students trained to read each complete sentence as a unit, with a view to bringing out its significance as a whole and its emphatic portions?

85. What mistakes of enunciation, of **pronunciation**, of accent (stress), did you notice? Which of these were common to two or more students?

86. Did the class exercises indicate that the students were trained to understand adequately the words used by them? Cf. question 29.

87. How closely was the **written work** corrected for grammar, spelling, use of words, clearness of sentence-structure?

88. Did the teacher insert the **corrections**, or use conventional signs?

89. Were the students required to re-write papers?

90. Were **paragraph papers** written in your presence? If you had an opportunity of examining such papers, what is your estimate of them as evidence of the writers' training?

91. Did any students write exercises on the blackboard? Were such exercises corrected by other students? Orally, or also in writing on the blackboard? How searching was the correction?

92. To what extent and in what ways were the reading and interpretations of English texts, prose or poetry, and the writing of English papers, (paragraphs or longer papers), mutually helpful?

93. How were **grammar and composition** (rhetoric) taught? With, or without, a manual (text-book)? Was the instruction practical, or merely theoretical? Did the topic selected prove attractive to the pupils?

J. Observation of Classes in History and Civics

(a) Questions relating to history

94. **Place in the curriculum.** What courses were given in history? Were they elective or required? What proportion of the pupils study American history, and for how long?

95. Was Greek and Roman history taught in intimate connection with Greek and Roman literature?

96. Were history and civics taught together or as separate courses? If the latter, were they taught by the same teacher?

97. Was there any attempt to correlate work in drawing with the study of history?

98. **Method of presentation.** Was a text-book or books used; if so, what? Was reading assigned in other texts or works of reference?

99. To what extent, if at all, was use made of the 'problem-setting' or the 'topical' method: did it supplant the use of a text-book?

100. Was any attempt made at research work, in the sense of consultation of original sources, hunting up the facts of local history etc.?

101. Were discussions or debates held in the class?

102. **Content and type of course.** Was ancient and medieval history studied in preference to, or to the exclusion of, modern history?

103. Was the history of foreign countries studied in preference to, or to the exclusion of, American history? If so, why?

104. Did the study of American history cover the same ground that had previously been studied in the grades? If so, how did the high-school course differ from the grade course:—in selection of material, complexity of the problems studied, greater emphasis on causal relations on the principles involved, different methods of study, mere increase of detail, or what?

105. Was overmuch time apparently given to the consideration of certain periods or to details that were relatively unimportant, *i. e.* did the text or did the teacher exhibit lack of perspective?

106. **Chronological relations.** What principle seemed to determine the number and kind of dates selected to be learned? Were too many dates required? Too few? Was the learning of a prescribed list of dates made an independent exercise? Was any time spent in developing a systematic chronology so as to insure correct temporal perspective? Were any chronological charts or other devices employed to fix important dates, periods, or sequences of events, *e. g.*, the campaigns of the Civil War?

107. **Geographical relations.** Was the study of the history of a country or section preceded by careful study of its geographic features? Were adequate maps employed? Were any maps drawn by the pupils?

108. Did the teacher take measures to associate historic events with the places where they occurred? Did he, for instance, adopt the plan of assigning essays on the historic scenes clustering about a given locality, as "Lake Champlain in History," or "Historic Landmarks of Salem and Vicinity?" Did the teacher appear to have visited personally the localities under discussion?

109. Was any specific study of the **physiography** of countries or sections of countries undertaken in order to show the influence of soil, climate, food-supply, configuration of the country, and other factors in shaping history, *e. g.*, effect of the geographic isolation of England, effect of the Nile on Egyptian civilization, effect of the climate and geography of Greece on its history, effect of the situation of great cities like London, Rome, and New York on their historic development?

110. **Logical or causal relations.** Montesquieu, in his *Spirit of Laws*, asserts that "the course of history is on the whole determined by general causes, by widespread and persistent tendencies." Guizot,

however, remarks that "nothing tortures history more than logic." Was the teacher skilful enough to bring out these fundamental causes and broad tendencies without falling into the error of torturing historic truth by the imposition of debateable doctrines and interpretations of his own? Were the pupils made to do enough thinking to avoid the tendency of reducing history to mere memoriter work?

111. It is commonly agreed that the American Union in its present proportions would have been impossible without the invention of the steam engine and the telegraph: was the effect of **invention and industrial progress** generally in shaping the course of history clearly brought out?

112. **Training—mental, moral, and social.** Professor Jenks, in his *Citizenship and the Schools*, regards as of the greatest consequence in the training of citizens, "the cultivation in our schools of the spirit of impartiality, which gives sound judgment, and a feeling of personal responsibility." Was the teaching of history so conducted as to inculcate this spirit of toleration as a prerequisite for the formation of sound social judgments? Were the pupils, for instance, brought to see that there were arguments on both sides of such questions as precipitated the War of the Revolution and the Civil War, or were, on the contrary, partizanship, sectional or racial pride, fostered by the manner of presentation?

113. Were pupils taught to distinguish between facts, and opinions about facts or interpretations of facts?

114. Was history so taught as to inculcate ideals and standards of honor, worth and integrity?

115. In particular, was history so taught as to stimulate pupils to take an active and intelligent interest in the conduct of civil affairs?

116. **Teacher's qualifications.** Hinsdale enumerates the following as essential qualifications of the teacher of history: (1) familiarity

with the subject-matter and a good sense of perspective and proportion, (2) a desire to state and point the truth impartially and without bias, (3) enthusiasm for the subject, (4) ability to tell a tale in a pleasing way and in clear and simple language, (5) a retentive memory, (6) a vivid imagination, (7) sound judgment and an insight into character, (8) close touch with current affairs, including acquaintance with civic institutions and knowledge of political economy, (9) personal familiarity with historic localities, (10) some knowledge of antiquities, and a wide acquaintance with general literature. Which of these qualifications did you see exhibited by the teacher? Did any of them appear to be lacking?

(b) *Questions relating to civics*

117. Was any text-book employed: if so, what?

118. Was there any formal study of economics?

119. Was there discussion of current political issues, general or local? If so, was this discussion confined to classes in civics, or made a general school exercise, *e. g.* current events' talks, etc.?

120. Did instruction deal first with local, State, or National government? Which of these received most attention? Which is most important in the high school?

121. Was sufficient attention given to the line of separation between State and National authority?

122. Was study made of political organizations and political machinery,—of parties, caucuses, conventions, etc., and of the part played by them in our government?

123. Was any attention given to the comparative study of political institutions and forms of government, *e. g.*, of France, Germany, England, or of Greece and Rome? Was the pupil brought to see that other forms of government than our own may exhibit some merits?

124. Was the evil as well as the good in present social and civic con-

ditions definitely brought out, and was there any stimulating discussion of the remedies therefor?

125. Was any attempt made to study the school as a social agency in the community, *e. g.*, its support, its benefits, its defects, etc.?

126. Did the class or the school as a whole engage in any activities that would allow the practice of social or civic virtues, *e. g.*, organized philanthropy, formation of a charity society, 'Street-Cleaning Brigade,' etc.? In particular, was the 'School City' or any similar form of self-government tried, and if so, with what success? Report in detail. Cf. question 38.

K. Observation of Classes in Mathematics

127. **Place in the curriculum.** Cf. question 1. Was any **correlation** attempted between the various branches of mathematics or between mathematics and physics, chemistry, physiography, manual training or other studies, or were the several branches of mathematics taught on the 'water-tight-compartment' plan?

128. Had the pupils been taught simple algebra or concrete geometry in connection with arithmetic or drawing in the grade schools?

129. **Content of course.** Was any attention paid to **post-Euclidean developments** of geometry, such as anharmonic ratio of four points on a straight line, the use of motion or algebraic solutions in proof, the modern geometry of the triangle, non-Euclidean geometry, etc.?

130. Were the principles not found in the text-book developed in the class; by the teacher alone or teacher and class together?

131. Were **practical applications** enforced wherever possible? Was the use of mathematics as a tool for the study of nature kept in mind? Cf. questions 127, 134 and 149.

132. Was the theory of limits or nature of irrational numbers taught? If so, was the work done correctly and was it understood by the pupils?

133. **Methods: type of instruction.** Was the lesson as presented an instance of analysis, synthesis, deduction or induction?

134. Was use made of the **laboratory method**,—of physical apparatus, measurement, fieldwork, surveying, cross-section paper, graphics, paper-folding, mechanical drawing, models, etc.? Was the stereoscope used in solid geometry?

135. Did the teacher have sufficient knowledge and skill to keep the work above the level of mere **rote learning** or mere mechanical application of axioms and rules?

136. What use was made of **note-books** or exercise-books?
137. Was there any **oral work** in algebra comparable to oral arithmetic?
138. Was the use of the **slide rule** in computation taught?
139. Was liberty allowed in **notation** or a uniform system demanded?
140. **Mental training.** Geometry and algebra are said by various writers to furnish disciplinary training of such mental functions as the following:—grasping a situation, appreciation of what constitutes completeness of proof ('Q. E. D.-ness'), the formation and use of symbols, reverence for truth, ingenuity, constructiveness, creative imagination, esthetic appreciation of symmetry and proportion, appreciation of the worth of knowledge for its own sake, self-scrutiny, attentiveness, neatness, accuracy, and deductive reasoning: did you see in the work you observed any signs of such mental training, if so, of what sort?
141. Did you see any opportunity for training in 'contingent conclusions'?

L. Observation of Classes in Physics and Chemistry

(With some modification many of the questions in this Section may be utilized in the observation of classes in other branches of science.)

(a) *Place in the curriculum*

142. What was the sequence of science work of the school in general? In what year was this science taught? If more than one course was offered, were the courses continuous? Was the work required of all pupils? Was there a 'popular' course as well as a college preparatory in this science? Was there a descriptive or general science course in the first year of the school? Had the pupils had any previous work in the subject (science work or nature study) in the elementary schools?

143. Was all the science teaching done by one teacher? Did this teacher have charge of any branches other than science? How did this effect the character of the work in this science?

(b) *Form of instruction*

144. What was the total number of periods and total actual hours given to this subject? What proportion of this time was given to class work, lecture demonstration work, and laboratory work respectively?

(c) *Content and type of the course*

145. Did you note any evidence of the lack of **adaptation** of the work to the mental abilities, interests, and needs of adolescents, *e. g.*, work too abstract, too remote from real life, too mathematical, too minute, too difficult, etc.?

146. Was the **standpoint** in the main that of work in pure science or in applied science, *i. e.*, was much stress laid upon the relation of the science to daily life, industrial and commercial applications, etc.? Did the class visit industrial plants?

147. Was the subject taught as if science were organized knowledge

or as if it were a process or method of organizing knowledge, *i. e.*, was familiarity with subject-matter or familiarity with the spirit and method of science made primary?

148. Were **abstract concepts**, complicated theories, and speculations taught at the expense of, or prior to, an adequate knowledge of facts, *e. g.*, was discussion of the definitions of heat as the kinetic energy of molecules demanded of pupils who could not give an intelligible description of a heating plant?

149. Was much emphasis placed upon **measurement**; upon exact quantitative treatment, upon computation, graphic work, plotting curves, equations, and mathematical work generally? Was the student in chemistry required to write equations for qualitative changes?

150. Was rigor and **logic overemphasized** at the expense of scientific 'intuition' and imagination, *e. g.*, by requiring the pupil to prove something which he recognized as true at once?

151. Was due advantage taken of the **personal, biographic, and historical features** of the science; how were these features introduced and utilized?

152. Was any use made in demonstration or experiment of **physical toys**, such as balloons, soap-bubbles, color-tops, engines, motors, the kaleidoscope, etc.? Was advantage taken of the present interest in gas engines and other forms of the explosion-motor?

153. What **text-book** was used? Was it satisfactory? Was more than one text used? In chemistry, did the text follow the nature-study, theoretical, or historico-systematic presentation?

154. Was the work of the **course well organized** and proportioned, or was it trivial and superficial in scope ('chicken-feed science')? Did it attempt to give a rapid general survey of the whole science or to devote intensive study to restricted portions?

155. Was the work so taught as to develop enthusiastic **interest** and to inculcate the spirit of science or was it sterile and perfunctory?

Was the teacher in love with his work, in sympathy with the ideals of science, and did he know more than the text-book contained?

156. Was the **work of the teacher hampered** by lack of appreciation of the importance of his subject on the part of the public or of the school board, by lack of equipment or funds, by the requirement of over-much work, by the restrictions imposed by college requirements or set forms or syllabi of any sort, by lack of library facilities in the school or locality, by lack of stimulus from meetings with other science teachers, etc.?

157. What seemed the **main object of the course**; what advantages did the teacher seek to give the pupil as a result of pursuing this course:—a knowledge of natural phenomena, a basis for other high-school studies, a means of guidance in daily life, increased manual dexterity, preparation for college examinations, appreciation of the spirit of science, mental training, as in observation, cautious comparison and induction, in the appreciation of the worth of facts versus opinion and authority, in creative imagination, in mental rectitude, or what?

(d) *The Laboratory Work*

158. **Equipment.** Was there a special laboratory room? Was it shared by several sciences or reserved for one? Was it adequately equipped with desks, apparatus-cases, water, gas, electric power, projecting lantern, dark shades, hoods, balances, etc.? Was all the drill apparatus in duplicate? Were there any very costly pieces? Was expensive apparatus used where cheaper forms would have answered? Was the apparatus kept in good condition? Was there an apparatus room? Did the teacher or some one else have charge of the distribution of apparatus?

159. Was the laboratory or lecture room provided with illustrative charts, with portraits of men of science, with photographs of industrial processes, etc? Was there any collection of minerals, crystals, manufactured products, raw materials, etc.?

160. **Nature of the work.** Were pupils led to experiment mainly for the sake of discovery (or pseudo-discovery), or verification, or simply of inquiry? Which received the greater emphasis, the determination of efficiency or the verification of laws? Cf. question 187:

161. **The purposes of laboratory work** have been variously stated: it has been said, for instance, that a good laboratory experiment (1) should illustrate an important principle in physics, (2) should help fix in mind a principle that is in practical use, (3) should interest and arouse the pupil's curiosity. (4) should illustrate and emphasize the nature of scientific work, (5) should make the learner realize that he is studying things rather than statements, (6) should tend to develop independent thinking, (7) power to reason, (8) self-reliance, (9) accuracy of expression, (10) should foster skill in manipulation, (11) skill in methods of experimentation, (12) should verify something learned in the class, (13) should be suggestive of further experiments, (14) should raise the pupil's ideals of careful, painstaking work. Which of these purposes and ideals were exemplified in the work you witnessed? Which not?

162. Was any **research work** done either by teacher or pupils?

163. **The laboratory class.** What was the size of the section? Did all undertake the same experiment: if not, how many different experiments were performed simultaneously? How many experiments were performed by each pupil during the course? Did the pupils work individually, in pairs, or in larger groups? If in groups, did the co-operation seem desirable? Authorities are agreed that the laboratory work must be undertaken in a 'double-period': was this done in the school visited? Was any laboratory work done outside of regular school hours?

164. **Laboratory direction and supervision.** Were the printed directions (manual or syllabus) coherent: were they adequate, meager, or over-elaborate? Did the teacher have to supply additional direc-

tions by blackboard, typewritten or verbal instructions? Had the teacher made full preparation of materials and apparatus before the experiment?

165. Was the teacher in continuous **attendance** during the period or were pupils allowed to work by themselves?

166. Did the teacher perform any part of the experiment for the pupils?

167. If **demonstrations** were given, were they to be performed later by the pupils, or were they experiments demanding special skill?

168. **Note-books and treatment of observations.** Was a printed form used for report or note-book? Was there a set form for the reporting of all experiments? Were the directions for the experiment as given in the manual copied into the report, or omitted entirely, or re-expressed in the pupil's own language?

169. Was there a book for **original notes** in addition to the final report-book: if the latter was 'written up' after the experiment, were the original notes also preserved and submitted? Were the final reports written in the laboratory or at home? Was the time taken out of the laboratory period?

170. Was the note-book work so laborious and unhelpful as to be mere drudgery?

171. Were the reports neatly and legibly written? Were the original notes or observations?

172. Did the teacher insist upon the recording of the results actually observed? Could the '**conclusions**' recorded by the pupils be actually and legitimately derived from their observations, or were the results 'cooked' or the inferences 'warped' to accord with the text-book statements?

173. In **computation work**, did the teacher carefully indicate the legitimate limit of fineness ('significant figures') to which the results could be carried?

M. Observation of Classes in Biology: Botany, Zoology, and Human Physiology

(Utilize such questions in Section L, as bear upon work in biology).

(a) Questions relating to all the biological sciences

174. **Place in the curriculum.** Were botany, zoology, and physiology combined and correlated into a single course? Is so, in what year was it given, and how was the time distributed to each science? Did this course precede or follow work in physical science? If botany and zoology were combined, but human physiology given independently, ascertain the reasons for this if possible.

175. **Nature-study.** Had the pupils studied plants and animals in the nature-study work of the grades? Did this elementary work seem to be of value in stimulating interest in high-school biology? Did the high-school and grade teachers cooperate in this work so as to correlate and systematize the instruction? Did the elementary work enable the high-school teacher to give work of a more advanced character?

176. Was the course arranged to meet the **practical needs** of the average pupil or to develop botanists and zoologists and prepare for further work in science? Was any stress laid upon the applications of biology, economic, technological, hygienic, etc., *e. g.*, food values of plants and animals, their use in industries, source of nitrogen, production of new varieties, bacteria and health, infection and disinfection, contagion, vaccination, pure food, air, water, etc.?

177. Was the course so arranged and taught as to inform the pupils in regard to the general nature of **organic evolution**? Do you think that either teacher or pupils had an adequate idea of the nature and significance of evolution and of the importance of the 'genetic' point of view?

178. **Reproduction.** Did the text or the teacher intentionally avoid all reference to sex and reproduction in either plants or animals, or were the essential facts made an integral part of the course? Was attention given, *e. g.*, to cross-fertilization, hybridization, crossing, and allied topics in botany or to spontaneous generation, asexual reproduction, parthenogenesis, fertilization, cell-division, the general nature of inheritance, etc., in zoology? Was the study of reproduction in plants or animals intentionally so conducted as to teach something, whether directly or indirectly, concerning the facts of sex or hygiene of sex in human beings?

179. What **text-books** were employed? What was the distribution of time to text-book, laboratory or field work respectively? Which type of work was primary?

180. Was due attention paid to the **biographic and historic features** of biology, *e. g.*, to the lives of Darwin, Huxley, Agassiz, Virchow, Pasteur, to the discovery of the circulation of the blood, promulgation of the cell-theory, of the germ-theory of diseases, publication of the *Origin of Species*, etc.?

181. Did you see any evidence of the **over-emphasis of nomenclature** and technical terminology condemned by Hall, *Adolescence*, ii., 148f., 210. ?

182. Did you note any errors in the **use of terms**, particularly of the terms 'cause' and 'purpose,' due to an improper teleological interpretation of nature, *e. g.*, "The squash seed has a peg because it needs it to open the seed-coat?" Or did the teacher permit the loose and inaccurate use of terms, of 'explanations' that did not explain, *e. g.*, "The veins carry impure blood," "Food is needed to keep the body alive."

183. Did you note any **sentimentalism**, *e. g.*, the teaching of an indiscriminating love of animals and plants, refusal to take life for pur-

poses of instruction and examination, the ascription of quasi-human attributes to plants, etc.?

184. Were fundamental and **essential principles** lost or obscured in a superabundance of less important details?

185. **Laboratory work.** On **equipment**, cf. questions 158 and 159. Was the lighting adapted for microscopy? Was the equipment adequate for work in biology? Note, for instance, the presence or absence of suitable microscopes, dissecting stands, aquaria, vivaria, living and preserved specimens of plants and animals, dark room, conservatory, camera lucida, paraffin oven, microtome, projection lantern, clinostat, auxanometer, collection of illustrative charts, photomicrographs, etc.

186. Were the **local fauna and flora** used where possible in preference to specimens purchased from dealers? Was material collected by the pupils wholly or in part?

187. Was the **laboratory work** largely **verification or investigation** ('discovery,' 'interrogation')? If both were used, which took the longer time? Which seemed to you better for acquiring information? Which for training in scientific method? Cf. question 160.

188. Was too much **drawing** required? Were all drawings original or was some copying from books permitted? Did the teacher require finished, artistic drawings or merely rough, simple outline drawings, provided they showed the essential features?

(b) *Questions relating to botany*

189. **Content and type of course.** Did the course belong to (a) the herbalist (descriptive analysis), (b) the plant-and-animal (fern-earth-worm), (c) the synthetic, or (d) the 'type' variety of course, or (e) were the main divisions of botany taken up separately? If synthetic, was morphology or physiology made primary? Was particular stress laid on any one phase, such as anatomy, physiology, ecology, or classification of plants?

190. Were the pupils required to make an **herbarium**?

(c) *Questions relating to zoology*

191. **Content and type of course.** Did the course belong to the type emphasizing 'natural history' or to the type emphasizing morphology and anatomy? Was it like nature-study continued, with the fostering of interest in animal life as the primary purpose?

192. Of the principal **phases of zoology** that have been suggested for high-school treatment—anatomy (gross and microscopical), physiology, ecology (bionomics), classification, embryology, palaentology, evolution and descent, economic zoology, and history of zoology,—which were studied in the course under observation? Were the several phases taught separately or more or less in conjunction, *e. g.*, was the study of the physiology of any form intimately correlated with that of its anatomy?

193. In what order were the **phyla** studied: what types or what animals were selected to represent these phyla?

194. What was the **beginning work**? Was it of the natural history type? Was the use of the microscope taught at once? Was the animal first studied a protozoan or metazoan? How much time was given to this first study?

195. Was special time devoted to any of the following animals:—fish, cray-fish, earth-worm, frog, grass-hopper, rat, rabbit, cat?

196. Was the **study of invertebrates** accorded more time than the study of vertebrates?

(d) *Questions relating to human physiology*

197. **Content and type of course.** Was the work conjoined and correlated with biology proper, *i. e.*, was it presented as the biology of man,—species, varieties, distribution, morphology, etc., or given independently?

198. Was excessive attention given to **anatomy**?

199. Was the **teaching of hygiene** confined to text-book and mem-

oriter work or were demonstrations and experiments given? Were the principles of hygiene made significant by encouraging their immediate application to the daily life of the pupils?

200. **Temperance instruction.** Was this required by law in the high school? Was it given entirely as text-book work? How much space was given in the course and in the book to alcohol and narcotics? Were all the statements made in strict accordance with the results of scientific investigation? How much of this material was straight physiology, how much economics, ethics, etc.? What seemed to be the effect of such required instruction upon the teacher, upon the pupils, and upon interest in the study of scientific physiology?

N. Observations of Classes in Physical Geography and Geology

(With slight modification many of the questions relating to the physical and biological sciences may be utilized in the observation of the study of the earth sciences. The questions in Sections L and M should therefore be kept in mind here as well as those in Sections B, C, and D.)

201. **Place in the curriculum.** In what year was this subject taught? Was a full year devoted to it? Was it prescribed or elective?

202. **Content of course.** What was the percentage of time given to the three major divisions,—atmosphere, ocean and lands? Was any attention given to the purely astronomical and geological phases? (Note that the Regents of New York State have prescribed this, but that most physical geographers are not in favor of it.)

203. **Text and reference books.** What text-book was used? Did the teacher encourage and require the use of reference books, and what in general were these? Did the teacher supplement the text by lectures or other means of instruction, and was he competent to do so? How many other subjects, and what, did the teacher have in his charge?

204. **Laboratory.** Was there a special laboratory for this subject: if so, what did its equipment include? Did it provide for experimental work with water, or was the work confined purely to the study of maps, models, and specimens?

205. Do the school authorities recognize the importance of better equipment and encourage the teacher in efforts to develop the laboratory, or has the development succeeded in spite of the authorities?

206. How much **time** was devoted to laboratory work?

207. What was the apparent **pedagogical aim** of the laboratory instruction aside from the mere conveyance of information.? Cf. questions 34, 160, 161 and 187.

208. What facilities does the region afford? **Field work** is generally recognized as the best means of giving instruction in this subject: if there is no field work, what is the reason: are there any obstacles in the way of taking field classes, such, for example, as lack of time, or expense attached to the work?

209. How were the results of laboratory or field work preserved? Was a regular **note-book** used? One of the standard laboratory manuals? Which one? Was it found to be satisfactory? If not, in what respects? Cf. especially questions 168-170.

References for Consultation

For the best utilization of this guide the observer should have a general familiarity with the problems which arise in the teaching of those classes which he proposes to visit. Aside from psychology and hygiene most of the points which have been raised in these questions are covered in the following references.

- C. Bennett and G. Bristol, The Teaching of Latin and Greek.
- H. Bourne, The Teaching of History and Civics.
- E. Bagster-Collins, The Teaching of German in Secondary Schools.
- G. Carpenter, F. Baker and F. Scott, The Teaching of English.
- P. Chubb, The Teaching of English.
- C. DeGarmo, The Principles of Secondary Education.
- F. Gouin, The Art of Teaching and Studying Languages.
- G. Hall, Adolescence.
- B. Hinsdale, How to Study and Teach History.
- F. Lloyd and M. Bigelow, The Teaching of Biology.
- A. Smith and E. Hall, The Teaching of Chemistry and Physics.
- D. Smith, The Teaching of Elementary Mathematics.
- J. Young, The Teaching of Mathematics.
- A New Movement among Physics Teachers, School Review, xiv., Nos. 3, 6, 9, 10: School Science and Mathematics, vii., No. 4.



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